Claims

1. A high-resolution frequency order analysis/diagnosis smart system for rotor, comprising:

(a) a data acquisition means, for measuring the vibration signal and tacho signal of a rotor;

(b) a bench data setup means, for creating fundamental data of the bench in accordance with the measured vibration signal and tacho signal of the rotor as well as the characteristic of the bench itself;

(c) a STFT time-spectra analysis/re-sampled order tracking means, for obtaining the primary data of the frequency distribution for rotor operated in non-constant tacho by conducting a short-time Fourier transformed (STFT) time-spectra analysis and re-sampled order tracking in accordance with measured vibration signal and tacho signal;

(d) a Kalman filter means, for obtaining a high-resolution frequency order energy distribution of on-line updateable type by a model based Kalman filter frequency order analysis technique using the measured vibration signal and tacho signal as input data and parameters setup by the computation result of the time- spectra analysis and re-sampled order tracking;

(e) a fuzzy diagnosis means, for incorporating frequency order energy distribution calculated by the Kalman filter or RLS algorithmic means with data created by the bench data setup means to achieve a fuzzy diagnosis conclusion in accordance with a preset fuzzy diagnosis logic;

(f) a window interface (e.g., GUI), for outputting a diagnosis of failure type and order information in accordance with the fuzzy diagnosis conclusion achieve by said fuzzy diagnosis means; and

(g) By repeatedly making use the functions of those means, it is possible

for such system to achieve the real-time diagnosis on rotor.

2. The system as set forth in claim 1, wherein said fuzzy diagnosis means is adaptive to different bench so as to have different result on fuzzy relationship and alarm value.

3. A high-resolution frequency order analysis/diagnosis smart system for rotor, comprising:

(a) a data acquisition means, for measuring the vibration signal and tacho signal of a rotor;

(b) a bench data setup means, for creating fundamental data of the bench in accordance with the measured vibration signal and tacho signal of the rotor as well as the characteristic of the bench itself;

(c) a STFT time-spectra analysis/re-sampled order tracking means, for obtaining the primary data of the frequency distribution for rotor operated in non-constant tacho by conducting a short-time Fourier transformed (STFT) time-spectra analysis and re-sampled order tracking in accordance with measured vibration signal and tacho signal;

(d) a RLS algorithmic means, for obtaining a high-resolution frequency order energy distribution of on-line updateable type by a model based RLS frequency order analysis technique using the measured vibration signal and tacho signal as input data and parameters setup by the computation result of the time-spectra analysis and re-sampled order tracking;

(e) a fuzzy diagnosis means, for incorporating frequency order energy distribution calculated by the RLS algorithmic means with data created by the bench data setup means to achieve a fuzzy diagnosis conclusion in accordance with a preset fuzzy diagnosis logic;

(f) a window interface (e.g., GUI), for outputting a diagnosis of failure type

and order information in accordance with the fuzzy diagnosis conclusion achieve by said fuzzy diagnosis means; and

(g) By repeatedly making use the functions of those means, it is possible for such system to achieve the real-time diagnosis on rotor.

4. The system as set forth in claim 3, wherein said fuzzy diagnosis means is adaptive to different bench so as to have different result on fuzzy relationship and alarm value.

5. A method of performing high-resolution frequency order analysis/diagnosis on rotor, comprising following steps of:

(a) measuring the vibration signal of a rotor apparatus;

(b) creating fundamental data of the bench in accordance with the vibration signal and tacho signal measured in step (a) as well as the characteristic of the bench itself;

(c) obtaining the primary data of frequency distribution for rotor operated in non-constant tacho by conducting a short-time Fourier transformed (STFT) time-spectra analysis and re-sampled order tracking in accordance with the measured vibration signal and tacho signal;

(d) obtaining a high-resolution frequency order energy distribution of on-line updateable type by a model based Kalman filter frequency order analysis technique using the vibration signal and tacho signal measured in step (a) and parameters generated from the computation result of step (b);

(e) incorporating frequency order energy distribution calculated in step (d) with data created in step (b) to achieve a fuzzy diagnosis conclusion in accordance with a preset fuzzy diagnosis logic;

(f) outputting a diagnosis of failure type and order information in accordance with the fuzzy diagnosis conclusion draw from step (e); and

(g) By repeatedly making use the functions of those means, it is possible for such method to achieve the real-time diagnosis on rotor.

6. The method as set forth in claim 5, wherein said fuzzy diagnosis conducted in step (e) is adaptive to different bench so as to have different result on fuzzy relationship and alarm value.

7. A method of performing high-resolution frequency order analysis/diagnosis on rotor, comprising following steps of:

(a) measuring the vibration signal of a rotor apparatus;

(b) creating fundamental data of the bench in accordance with the vibration signal and tacho signal measured in step (a) as well as the characteristic of the bench itself;

(c) obtaining the primary data of frequency distribution for rotor operated in non-constant tacho by conducting a short-time Fourier transformed (STFT) time-spectra analysis and re-sampled order tracking in accordance with the measured vibration signal and tacho signal;

(d) obtaining a high-resolution frequency order energy distribution of on-line updateable type by a model based RLS frequency order analysis technique using the vibration signal and tacho signal measured in step (a) and parameters generated from the computation result of step (b);

(e) incorporating frequency order energy distribution calculated in step (d) with data created in step (b) to achieve a fuzzy diagnosis conclusion in accordance with a preset fuzzy diagnosis logic;

(f) outputting a diagnosis of failure type and order information in accordance with the fuzzy diagnosis conclusion draw from step (e); and

(g) By repeatedly making use the functions of those means, it is possible for such method to achieve the real-time diagnosis on rotor.

8. The method as set forth in claim 7, wherein said fuzzy diagnosis conducted in step (e) is adaptive to different bench so as to have different result on fuzzy relationship and alarm value.